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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/785,984 | 02/26/2004 | Hiroshi Yamauchi | 500.43535X00 | 2679 |

20457 7590 01/17/2007

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| EXAMINER | |
|---|---|
| CANTELMO, GREGG | |
| **ART UNIT** | **PAPER NUMBER** |
| 1745 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 01/17/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/785,984 | YAMAUCHI ET AL. | |
| | Examiner | Art Unit | |
| | Gregg Cantelmo | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☒ Claim(s) *6 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *SEE OFFICE ACTION*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Information Disclosure Statement*

2. The information disclosure statement filed February 26, 2004 has been placed in the application file and the information referred to therein has been considered as to the merits.

### *Drawings*

3. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claim 1 recites the limitation "the passage planes" in line 3. There is insufficient antecedent basis for this limitation in the claim;

b. Claim 2 recites the limitation "the passage planes" in line 9. There is insufficient antecedent basis for this limitation in the claim;

c. Claims 1-9 require that the gasket is provided in a portion other than the passage planes. However this arrangement is not particularly clear. According to Fig. 2, the Gasket 4 extends into at least one passage of the coolant passages and thus would appear to be within a passage plane. Furthermore it is unclear as what the claims mean by the term passage plane. Therefore the arrangement of the gasket relative to the passage planes is not clearly defined and held to be indefinite.

d. The genus of claims 6 and 11 is unclear. In particular the portion ", plated and electroconductive ceramic layer" is not clear as to whether this is one material ( a plated and electroconductive ceramic layer) or two materials (1- a plated material and 2 an electroconductive ceramic layer). If it's the latter then the scope of the term "plated materials" is indefinite since it doesn't reasonably describe what this term encompasses.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

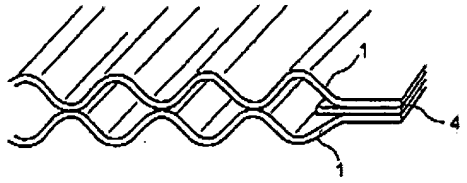
This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art relied upon in the instant application in view of U.S. Patent No. 7,070,872 (Sugiura).

Admitted prior art Fig. 7 discloses a cooling section of a fuel cell comprising a pair of metallic separators at least one of which has corrugated passages; and a gasket 4 in the portion other than the passage plane of the passages (Fig. 7 as applied to claims 1 and 7).

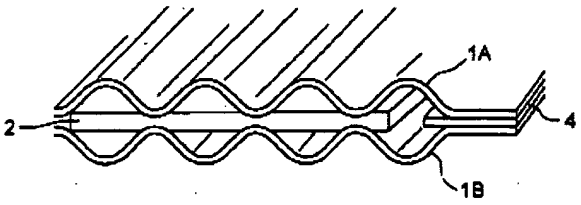
Admitted prior art Fig. 7:

FIG. 7




Comparative to the instant applications inventive concept in Fig. 1:

FIG. 1




The difference between the admitted prior art Fig. 7 and claims 1 and 7 is that Fig. 7 does not teach of providing an elastic and/or compressive and electroconductive intermediate between the passage planes of the two separator plates of the cooling section.

Sugiura discloses a fuel cell comprising a pair of metallic separators 142 at least one of which has corrugated passages; an intermediate 164 held between the passage planes in the separator; wherein the intermediate is elastic and/or compressive (see Figs. 7 and 8 and col. 7, ll. 47-56), and is a metal plate and thus electroconductive (col. 7, ll. 47-50 and Figs. 3, 4, 7 and 9 as applied to claims 1 and 7).

FIG. 3

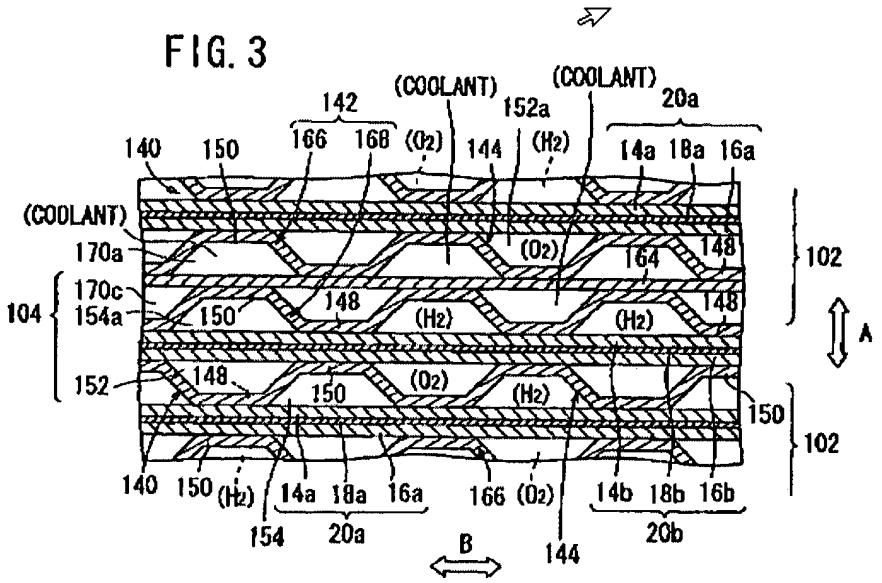
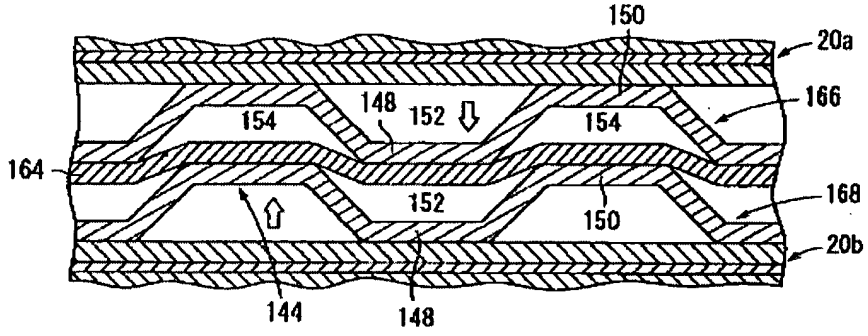



FIG. 7




The motivation for providing the intermediate 164 between the two separator plates of the cooling section is to provide an intermediate member which improves the

electrical contact between the separators and membrane electrode assemblies within the fuel cell stack (col. 7, ll. 48-58).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of the admitted prior art of Fig. 7, relied upon in the instant application, by disposing the elastic and electroconductive spacer element of Sugiura between the separator plates of the cooling section since it would have improved the electrical contact between the separators and membrane electrode assemblies within the fuel cell stack.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art of Fig. 7, relied upon in the instant application in view of Sugiura as applied to claim 7 above, and further in view of U.S. Patent No. 6,372,376 (Fronk).

The difference not yet discussed is of the intermediate sheet having openings in the sheet.

Fronk teaches of providing an intermediate sheet 62 between two separator plates defining a cooling portion of a fuel cell stack (See Fig. 3). The plate 62 further includes openings 88 which permit coolant to flow between the channels on opposing sides of the intermediate plate in the cooling array thereby breaking laminar boundary layers and affording turbulence which enhances heat exchange in the cooling section.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of the admitted prior art of Fig. 7, relied upon in the instant application in view of Sugiura by further providing openings

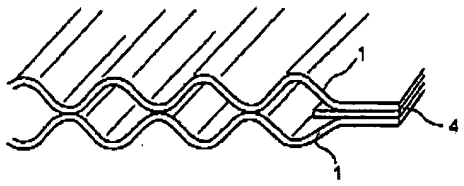
in the intermediate sheet as taught by Fronk since it would have improved the heat exchange and cooling aspect of the cooling section.

8. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art relied upon in the instant application in view of U.S. Patent No. 6,838,202 (Brady).

Admitted prior art Fig. 7 discloses a cooling section of a fuel cell comprising a pair of metallic separators at least one of which has corrugated passages; and a gasket 4 in the portion other than the passage plane of the passages (Fig. 7 as applied to claims 1 and 7).

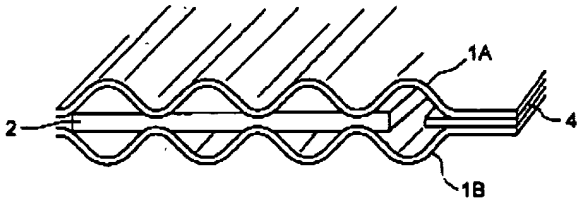
Admitted prior art Fig. 7:

FIG. 7




Comparative to the instant applications inventive concept in Fig. 1:

FIG. 1




The differences between the admitted prior art Fig. 7 and claims 1 and 7-8 are that Fig. 7 does not teach of providing an elastic and/or compressive and electroconductive intermediate between the passage planes of the two separator plates of the cooling section (claims 1 and 7) or of the intermediate sheet having openings in portions which are not in direct contact with the separator for cooling (claim 8).

Alternatively Brady discloses providing an electrically conductive foam between adjacent separator plates 70 and 74. The foam 80 is both electroconductive and, as a porous foam, also compressible or elastic (Fig. 3 and abstract as applied to claims 1 and 7).

Furthermore the foam sections include opening portions therein which are not in direct contact with the separator and provide for defining cooling passages in the foam (Fig. 3 as applied to claim 8).

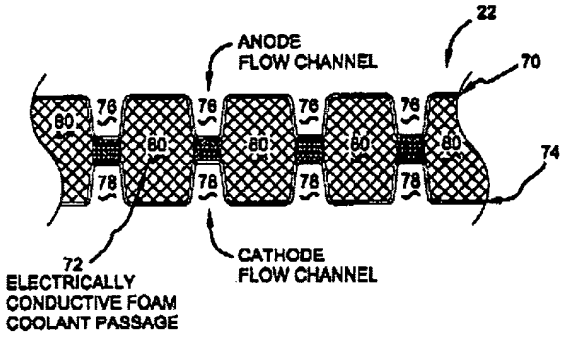



*Figure 3*

The motivation for using the foam is that it provides for regions of high density to improve the conductive nature of the multilayer separator arrangement and regions of low density which have adequate cooling space and well as a conductive mesh network within the coolant spaces 80.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of the admitted prior art of Fig. 7, relied upon in the instant application, by disposing the elastic and electroconductive spacer element of Brady between the separator plates of the cooling section since it would have it provided for regions of high density to improve the conductive nature of the multilayer separator arrangement and regions of low density which have adequate cooling space and well as a conductive mesh network within the coolant spaces.

9. Claims 1-4 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,838,202 (Brady) in view of admitted prior art relied upon in the instant application.

Brady discloses providing an electrically conductive foam between adjacent separator plates 70 and 74. The foam 80 is both electroconductive and, as a porous foam, also compressible or elastic (Fig. 3 and abstract as applied to claims 1 and 7).

Brady discloses a fuel cell stack comprising electrolyte membrane electrodes, gas diffusion layers and a metallic separator (Fig. 1 and col. 3, ll. 5-60) where the separator includes corrugated metal foils 70 and 74 which is further provided with providing an electrically conductive foam 80 between adjacent separator plates 70 and 74. The foam 80 is both electroconductive and, as a porous foam, also compressible or elastic (Fig. 3 and abstract as applied to claim 2).

Furthermore the foam sections include opening portions therein which are not in direct contact with the separator and provide for defining cooling passages in the foam (Fig. 3 as applied to claims 3 and 8).

The foam can be a metal foam, graphite foam or carbon foam. The graphite and carbon foams are equivalent to the broader carbon paper, carbon cloth and graphite sheet as claimed (as applied to claims 4 and 9).

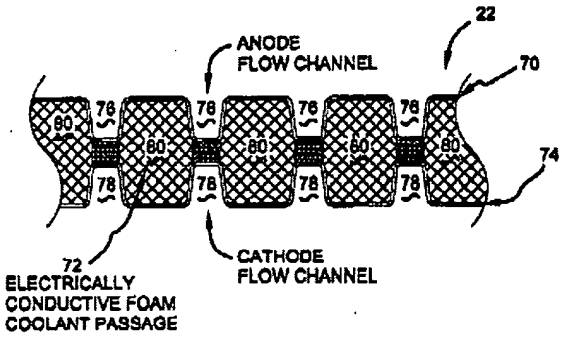


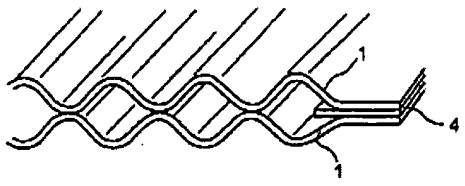

*Figure 3*

The differences Brady claims 1 and 7-8 are that Fig. 7 does not teach of providing the claimed gasket.

Admitted prior art Fig. 7 discloses a cooling section of a fuel cell comprising a pair of metallic separators at least one of which has corrugated passages; and a gasket 4 in the portion other than the passage plane of the passages (Fig. 7 as applied to claims 1 and 7).

Admitted prior art Fig. 7:

FIG. 7



Gasket 4 provides a means for sealing the ends of the adjacent plates in a composite cooling plate arrangement and prevents coolant from leaking from the coolant channels.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Brady by using a similar sealing arrangement as that shown in the admitted prior art of Fig. 7 since it would have provided a means for sealing the ends of the adjacent plates in a composite cooling plate arrangement and prevents coolant from leaking from the coolant channels.

10. Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brady in view of the admitted prior art of Fig. 7, relied upon in the instant application in as applied to claims 2 and 7 above, and further in view of either JP 2000-058080 (JP '080) or U.S. Patent No. 5,776,624 (Neutzler).

The difference not yet discussed is of providing corrosion resistant coatings on the separator plates.

JP '080 discloses providing an aluminum alloy protective coating on the separator plate (abstract). Neutzler discloses providing various metallic coatings to a separator surface (col. 2, ll. 16-34).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Brady in view of the admitted prior art relied upon in the instant application by coating the separator with the coating of either JP '080 or Neutzler since it would have provided a corrosion resistant barrier to the separator. The selection of a known material based on its suitability for its

intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

***Allowable Subject Matter***

11. Claims 6 and 11 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

12. The following is an examiner's statement of reasons for allowance: none of the prior art of record are considered to teach, suggest or render obvious the invention of claims 6 and 11, in particular the prior art of record does not teach of the separator defined therein having both a metal coating and second coating provided at least on the surface for passing electric current.

The combination of coatings improves both the corrosion resistance and electrical conductivity of the separators in the fuel cell stack.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

gc
January 9, 2007

Gregg Cantelmo
Primary Examiner
Art Unit 1745